

Popular Science

Maximum Velocity

A compendium of the fastest things the world has to offer, and a celebration of the technological breakthroughs that feed the rush

By Gabriel Sherman Posted 02.01.2005 at 2:00 pm



Both man and machine are approaching the future at an ever-accelerating clip. Almost every year, our vehicles break speed records. This past fall, the X-43A scramjet-powered aircraft reached a speed of nearly Mach 10, beating a record of Mach 6.8 set only six months before. Today's fastest supercomputer, IBM's Blue Gene, is about 450,000 times as speedy as the ruling machine of 30 years ago and twice as fleet as the fastest machine of just one year ago. We build passenger trains that travel 267 miles an hour and rocket cars that break the speed of sound. Meanwhile, improvements in training and physiological understanding allow us to surpass our own physical-performance benchmarks in record time, and technological advances make it possible to more accurately measure the breakneck speeds achieved in nature. Hold on to your seat—we're not slowing down anytime soon.

.00000000709 mph

Pacific Plate: World's Fastest Tectonic Plate

Drifting northwest at the lightning pace of four inches a year, the Pacific Plate, which stretches from California to Japan below the ocean floor, clocks in at 24 times as fast as the slowest of the dozen rocky sheets that compose the Earth's crust.

5.17 mph

Alexander Popov: World's Fastest Swimmer

Popov swam the 50-meter freestyle in 21.64 seconds at the summer 2000 Russian national championships. The 6'6" swimmer's disproportionately large feet enable his tremendous kick.

.0000237 mph

Bamboo: World's fastest-growing plant

Bamboo grows up to three feet a day, more than 30 percent faster than any other plant. Parenchymal cells within the stem divide at a rapid rate to provide structural support for the woody grass. The result? Bamboo has one of the highest strength-to-weight ratios of any plant species.

37.6 mph

Secretariat: World's fastest thoroughbred

In the 1973 Kentucky Derby, Secretariat set a record that has remained unbroken for 30 years. Autopsy records show that the horse's heart weighed a hefty 21 pounds, three times the average for a thoroughbred his size.

.0000151 mph

Qori Kalis: World's fastest-receding tropical glacier

Qori Kalis, a glacier that lies at above 18,000 feet in the Peruvian Andes, is melting at a rate of nearly 700 feet a year. In 2002, Ohio State University paleoclimatologist Lonnie Thompson discovered a perfectly preserved *Distichia muscoides*, a moss-type plant that carbon dating measured as 5,200 years old, on the Qori Kalis. "The find was remarkable," he says. "This tells us the glacier hasn't been this small for more than 5,000 years." Part of the 17-square-mile Quelccaya, the world's largest tropical ice sheet, the Qori Kalis is now shrinking 40 times as fast as rates witnessed in the mid-1970s, when Thompson first traveled there. "We're seeing an exponential acceleration in the melting trend," he says, noting that every tropical glacier studied with time-lapse photography is melting. By current rates of retreat, the entire Quelccaya will be gone in 50 years. If the world's mountain glaciers melt completely, he says, the resulting half-meter rise in sea level would displace up to 100 million people in coastal areas around the globe.



The U.S.'s Fastest Recorded ...

Temperature Swing Loma, Montana saw a rise of 103°F between January 14 and 15, 1972. The low was -54°, the high 49°. The change was caused by a rapid shift in fronts: An arctic high-pressure system was replaced by milder westerly winds that warmed significantly as they moved east of the mountains.

Rainfall Between July 25 and 26, 1979, tropical storm Claudette dropped 43 inches of rain near Alvin, Texas. Claudette's proximity to the coast fed the system with moisture, boosting its strength as it formed a tight weather loop over southeastern Texas that ultimately caused \$700 million in damage.

Snowfall 75.8 inches of snow fell in Silver Lake, Colorado, between April 14 and 15, 1921. The more than six feet were dumped by a slow-moving storm system that rolled eastward over Silver Lake and was stalled by the bulk of the Rocky Mountains.



37.6 mph

Taipei 101: World's fastest elevator

Two 24-passenger cars zip at a rate of up to 55 feet a second up Taiwan's new 1,667-foot Taipei 101 tower. Spoilers that control noise levels, tuned weights that damp vibrations, and computer-controlled air pressure make the quarter-mile, 39-second trip bearable.



105.6 mph

The Fetish: World's fastest production electric car

Released last September from Monaco-based Venturi Automobiles, the low-slung Fetish is the world's first commercially available electric-powered sports coupe. The two-seater has an air-cooled 180-kilowatt engine that generates the equivalent of 300 horsepower and revs instantly to 14,000 rpm, allowing the car to accelerate from 0 to 60 in 4.5 seconds, performance that trumps a Porsche Boxster.

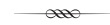
Although electric-powered research cars have traveled faster—Ohio State University's student-designed Buckeye Bullet set a new electric land-speed record of 314.96 mph last October—the Fetish is built for everyday driving. The car uses the latest generation of lithium-ion batteries to power it for more than 200 miles on a single charge. The price tag: \$660,000.



11.6 mph

Paula Radcliffe: World's fastest female marathon runner

In 2002, English track star Paula Radcliffe won the Chicago Marathon with a world-record-breaking time of two hours, 17 minutes and 18 seconds. Then, less than a year later, she ran the 2003 Flora London Marathon and finished in 2:15:25—beating her own record by nearly two minutes and slicing an unprecedented three minutes off her closest competitor. In a sport where speed improvements are marked in seconds, not minutes, Radcliffe redefines the rate of human performance gains. Prior to her record-smashing run, it had taken 16 years for women to knock a minute and 20 seconds off the world record. Radcliffe, 31, combines extreme training with breakthrough technology. Most of her practice sessions are logged at altitude near Font Romeu in the French Pyrenees or in Flagstaff, Arizona, where running in the thin alpine air boosts the oxygen-transporting red blood cells that are crucial to endurance. And two years ago, she began working with Nike engineers to design a marathon shoe. In Nike's Beaverton, Oregon, design lab, she ran on a specialized treadmill coupled with high-speed 3-D cameras that analyze foot strike, pressure and alignment. The result, the 6.8-ounce Zoom, is also available to mortals (\$85).



81 mph

Sam Whittingham: World's fastest self-propelled man

The self-propelled land-speed record was set in October 2002, when Canadian Sam Whittingham reached 81 mph inside a bullet-shaped recumbent bicycle on a flat course in Battle Mountain, Nevada. Whittingham's victory was attributed to his low body weight and particularly low-riding bike.



World's Fastest Computer Virus

MyDoom surfaced on January 26, 2004, racing across the Internet at a rate of up to 12,000 computers an hour and striking more than 500,000 machines within a week. The virus e-mailed itself to addresses stored on the user's machine and created a "back door" on the user's hard drive, which allowed its unidentified creators to remotely broadcast spam over the Internet. When MyDoom peaked three days after its initial outbreak, one of every 10 e-mails circulating on the Internet carried the virus—nearly twice as many as had been affected by any previous computer bug.



128 mph

Kingda Ka: World's Fastest Roller Coaster

When it debuts at Six Flags Great Escape in Jackson, New Jersey, this April, the Kingda Ka will blast from a standstill to 128 mph in 3.5 seconds, ousting Cedar Point's Top Thrill Dragster in Sandusky, Ohio, for bragging rights as the world's fastest thrill ride. Maryland-based coaster maker Intamin developed the \$25-million ride with a hydraulic catapult rated at 12,000 horsepower, a technology inspired by a previous generation of steam catapults used to hurtle U.S. Navy jets off the decks of aircraft carriers. The Kingda Ka's launch catapult produces explosive acceleration by releasing compressed hydraulic fluid and nitrogen gas stored in small tanks at pressures of up to 4,500 pounds per square inch. The system consumes three megawatts of power and can be fired and reloaded every 45 seconds, enabling the coaster to carry 1,400 riders an hour. After blasting out of the station and reaching maximum speed, the ride tips skyward and ascends to a record height of 456 feet before nosing more than 90 degrees into a 41-story plunge embellished by a 270-degree spiral twist. The Ka then careens up a second 129-foot hill, allowing riders to experience a few seconds of weightlessness before sweeping back to Earth. From beginning to end, the G-force madness lasts 50 seconds.



763 mph

Thrust SSC: World's fastest car

Roaring down a mile of desert in 4.7 seconds in 1997, the Thrust became the first land vehicle to break the sound barrier. The 10-ton car was powered by two 25,000-pound-thrust Rolls-Royce Spey Mk205 jet engines built for a British variant on the F-4 Phantom fighter plane.



3,409 mph

Lockheed Martin LOSAT: World's fastest missile

Fired from a Humvee, the LOSAT (Line-of-Sight Anti-Tank weapon) tops out at more than 5,000 feet a second—twice as fast as most ground- and air-launched missiles. The weapon, which will debut next year, has a five-mile range and is propelled by a solid-rocket motor. It employs no explosives; kinetic energy alone drives a penetrator rod into an enemy tank.



267 mph

Maglev: World's fastest train

Since December 29, 2003, Transrapid's Shanghai Maglev has traveled the 19 miles between the Chinese city's financial district and its airport in less than eight minutes, hitting a maximum speed of 267 mph. Levitated on a magnetic field, the train floats half an inch above its track and frictionlessly rides a magnetic wave.



World's Fastest Supercomputer

Every person on Earth would need to perform 100,000 calculations a second in order to equal the power of IBM's Blue Gene, which posted a new record speed last November. Since 1976, when the original supercomputer, the Cray-1, debuted, supercomputer speed has increased by a factor of 450,000. When fully complete this June, Blue Gene's projected speed will be almost five million times that of the Cray-1. Blue Gene's power—achieved by 131,072 IBM PowerPC 440 processors—is already twice as great as the previous record set just last May.

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6,800 mph

X-43A Scramjet: World's fastest aircraft

On November 16, 2004, NASA's dart-shaped, X-43A scramjet streaked above the Pacific at Mach 9.8, shattering the existing world aviation speed record of Mach 6.8, set last March by another X-43A scramjet flight. Carried aloft under the wings of a B-52B bomber, the X-43A was launched at an altitude of 40,000 feet. The 12-foot, unmanned research plane was the swan song of NASA's \$230-million, eight-year-long Hyper-X program, which tested the alternative engines that will propel the next generation of space vehicles and, perhaps, civilian airliners. Scramjets—engines that generate combustion from compressed supersonic air and gaseous hydrogen fuel—could power aircraft up to Mach 15, potentially cutting an 18-hour flight from New York to Tokyo down to two hours.



17,895 mph

The JASPER: World's fastest land-based projectile

Last year, researchers studying how America's nuclear stockpile will age began testing the properties of plutonium with a gas gun capable of firing a 25-gram projectile that flies 36 times as fast as a typical bullet. The 30-meter JASPER, operated by Lawrence Livermore National Laboratory, fires in two stages.

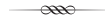
A powdered propellant provides the initial propulsion, and then a blast of compressed hydrogen triggers the extreme velocity. Projectiles 28 millimeters in diameter are shot into nickel-size plutonium targets linked with sensors that measure the material's reaction. The pressure of the impact exceeds 600 gigapascals—six million times the pressure of surface air, and representative of conditions that would exist in a nuclear detonation.



131,979 mph

Mercury: Fastest solar system object

Like the last few rapid spins of a dropped ring before it disappears down the sink drain, Mercury is whipping around an ellipse deep inside the sun's gravity well. The fastest of all large objects in our solar system, Mercury's speed is greatest when it is closest to the sun.



158,000 mph

Helios Probes: World's fastest man-made space objects

Launched into narrow elliptical orbits in 1974 and 1976, the Helios 1 and 2 probes move fastest as they skim the sun slightly inside Mercury's orbit. At their farthest out, they reach nearly to the Earth's orbit and slow to one fifth of their top speed.



24,759 mph

Apollo 10: World's fastest manned spacecraft

In May, 1969, returning from a dress rehearsal for the first moon landing, Tom Stafford, John Young and Eugene Cernan rode the command module of Apollo 10 as it entered the atmosphere at a steeper angle than any other spaceship before or since. Their top speed of 25,000 mph is the fastest any human has ever traveled.



670,616,628.99 ... mph

Cosmic ray: Fastest known object in the universe

A cosmic ray detected by the Fly's Eye I detector near Salt Lake City on October 15, 1991, was traveling so fast that if it raced a beam of light across the galaxy, it would lose by only five millimeters. Fifteen similar, but slightly slower, cosmic rays have been detected since, but scientists still don't know how they are formed.



Breakneck Bugs

World's fastest insect life cycle Bird cherry-oat aphids (*Rhopalosiphum padi*) take 4.7 days to complete one full generation, from the birth of one insect to the birth of that insect's offspring. Instead of laying eggs, aphids, like vertebrates, spawn live young, which allows the species to reproduce faster than any other insect.

World's fastest bite Trap-jaw ants (*Odontomachus bauri*) can open and close their microscopic jaws in 0.33 millisecond, clenching their teeth 1,000 times as fast as the blink of an eye. Tiny muscles within the jaw operate like loaded springs and give the bug a biomechanical advantage in preying on fast-moving insects. The ant's bite is faster than any other recorded animal movement, including the jellyfish's infamous 0.5-millisecond stinger release.

World's fastest wingbeat The midge (genus *Forcipomyia*) beats its wings 1,046 times a second. Hummingbirds, in comparison, flap their wings about 100 times a second.



Additional reporting by Eric Adams, Sarah Goforth and William Jacobs

Questions to Ponder...

Since this article was written in 2005, which categories do you think have new velocity winners?

What category would you add to this list?

What is the fastest you have travelled?